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ABSTRACT

This report presents the unique educational challenges of five programs in English for Science and Technology (EST) in Japan, Mexico, the Czech Republic/United States, Israel, and Hong Kong, including the challenges stemming from different educational/political systems and financial/technical resources. The five presentations cover typical EST concerns such as needs analyses, student motivation, faculty research, curriculum design, materials development, testing, high- and low-tech supported language learning, and teacher training. The first report details the EST training program at the University of Aizu in Japan, including a description of its students, its educational philosophy, courses offered, curriculum, and research activities. The program from the Center for Biological Research in La Paz, Mexico, has no official English learning program, but its 125 researchers and graduate students are forced to learn English to be able to publish their findings. For five consecutive summers, the Delaware County Community College in Pennsylvania has been sponsoring an intensive, 4-week English language program at the Czech Technical University in Prague; the curriculum, faculty, and students are described. The students, faculty, and curriculum of the architectural school program in Haifa, Israel, are also outlined; their classes are taught in Hebrew, but most of the texts are English. The details of the English Centre of the University of Hong Kong program in engineering and computer science are also presented. (NAV)

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Technical Report 95-5-001

ED 389 173

Serving Science and Technology: Five Programs around the Globe

Orr, T. (Chair), Bowers, R., Busch, D.,
Kushner, S., Mueller, E., de Prospero, A.

March 29, 1995

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Serving Science and Technology: Five Programs around the Globe

Orr, T. (Chair), Bowers, R., Busch, D., Kushner, S., Mueller, E., de Prospero, A.

English for Science and Technology (EST) is one branch of English for Specific Purposes (ESP) that is in great need of qualified English language educators to meet the exploding new demand for their services. As the scientific and technical professions continue to *internationalize* at a rapid pace, accelerated by the growth of Internet and increasing numbers of international conferences and journals, most scientists, engineers, and technicians recognize that expertise in English is their *passport* to active participation in professional communities, where the bulk of scientific and technical information is exchanged and archived in English, and where competence in English is increasing crucial for employment and promotion.

In order to better educate TESOL professionals that may be seeking employment in ESP or EST and to provide existing professionals with a wide spectrum of solutions to universal problems in the profession, six panelists representing English language programs in five nations (Japan, Mexico, The Czech Republic, Israel, and Hong Kong) detail the unique educational challenges they face in creating English language curriculums under vastly different educational/political systems and with a broad range of financial/technical resources at their disposal. The five presentations and the discussions that follow cover typical EST concerns such as needs analyses, student motivation, faculty research, curriculum design, materials development, testing, high and low-tech supported language learning, and teacher training. The colloquium provides a cross-sectional perspective of EST with multiple examples of creative approaches to program design.

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Note: The information in this publication is designed for distribution to conference participants attending the colloquium *Serving science and technology: Five programs around the globe* presented at TESOL'95, the Twenty-Ninth Annual Convention and Exposition sponsored by Teachers of English to Speakers of Other Languages (TESOL) and California Teachers of English to Speakers of Other Languages (CATESOL) in Long Beach, California held March 27 through April 1, 1995. This publication offers supplementary information for the colloquium audience on the language programs discussed in detail at the conference and offers others, not in attendance, opportunities to learn of representative programs currently operating in the area of English for Science and Technology (EST).

Center for Language Research
University of Aizu
Aizuwakamatsu,
Fukushima Prefecture, Japan

Thomas Orr

March 29, 1995

Overview

The University of Aizu, founded April 1, 1993, is a prefectural research university offering undergraduate programs in computer science hardware and software engineering with plans for the addition of a graduate school currently in progress. The university admits 250 freshmen every year, from an exceedingly large number of applicants, for a target student population of approximately 1,000 undergraduates. The undergraduate program and 25 research labs are staffed by 107 regular faculty and 7 visiting faculty, 57% of whom are non-Japanese and come from 16 foreign nations.[1] In addition, there are 46 full-time administrative, office, and facility support staff along with varying numbers of part-time employees.

The research and educational responsibilities shared by the faculty at the University of Aizu are divided according to the following organizational entities:

- School of Computer Science and Engineering
  - Department of Computer Software (comprising 17 research labs)
  - Department of Computer Hardware (comprising 8 research labs)
- Center for Mathematical Sciences
- Center for Language Research
- Center for Cultural Research and Studies

The Center for Language Research (CLR) serves the University of Aizu and Fukushima Prefecture by providing English language instruction for University of Aizu students, faculty, and staff as well as for junior and senior high school English teachers throughout Fukushima Prefecture. In addition to this, the CLR carries out research in various

[1] Statistics on February 1, 1995. These figures change monthly since specific research projects require joint participation from visiting researchers on short-term contracts.

aspects of English language acquisition that it hopes will serve language learners and instructors worldwide.[2]

Educational Philosophy

The bulk of the work at the Center for Language Research falls under the professional sphere of English for Specific Purposes (ESP), specifically, English for Academic Purposes (EAP), English for Science and Technology (EST), and English for Administrative Purposes (EAdmP), though the Center has other research and educational concerns as well. Its governing philosophy, reflective of the language education profession, is still under construction, as there yet remains much to be known about how humans learn languages and employ them effectively in an infinite range of contexts. The author of this paper, however, builds his own professional work on the following tentative assumption: *a language learner will successfully acquire a second/foreign language when language input is authentic, plentiful, meaningful, memorable, and immediately applicable for accomplishing the learner's personal goals in a personally satisfying way.*

Educational Environment and Facilities

The language-learning environment at the University of Aizu has two important features that greatly increase the opportunities for learners to acquire English successfully. One is the international mix of faculty that offers students daily opportunities to immediately use the English that they learn. Students work together with the English-speaking faculty in joint research projects from their freshman year, learn from them in courses or at laboratory-sponsored research lectures, eat with them in one of the university dining facilities, chat with them in their offices (most of which are equipped with conference tables and basic kitchen facilities), and socialize with them at one of the university-sponsored social or sporting events. This makes the university a truly bilingual campus where students have natural, daily exposure to English, a situation that is usually rare on the islands of Japan.

The second important feature of the language-learning environment that increases opportunities for learners to acquire English successfully is the state-of-the-art facilities where students may experience language and computer science-related instruction in the most electronically sophisticated university environment in Japan. With 24-hour magnetic card access to various computer laboratories around campus, each student may access World Wide Web through Netscape on one of the more than 700 dedicated Sparc workstations (Sun Microsystems) or a wide variety of PCs (e.g. Compaq, Mac, IBM, NEC, Fujitsu), laser printers, scanners, multi-media language-laboratory facilities or (with special permission) top-of-the-line equipment in the research labs. In addition, the 28 research libraries, a tape library, and the main campus library offer a large volume of books and professional periodicals in English as well as English videos, laser discs, CD-ROMS, cassette tapes and private language-learning booths for supplementary self-

[2] Additional information on the University of Aizu may be found at **http://www.u-aizu.ac.jp/** via World Wide Web.

instruction in English. A grammar crisis office for English editing and advising has also been built and will begin operation in the near future, as well as a fully-equipped filming and recording studio for the preparation of high quality educational materials.

Language Learners

The Center for Language Research currently serves five groups of language learners which have been divided according to commonalities in language background and instructional needs.

1. undergraduate university students (NJ)[3]
2. university faculty (NJ)
3. university faculty (NNJ/E)
4. university administrative and support staff (NJ)
5. prefectural junior and senior high school English teachers (NJ)

The majority of the Center's efforts are devoted to the first group of language learners, undergraduate university students which will number about 1,000 when the university admits its fourth year of freshmen in April of 1996. Presently, all students are Japanese citizens (though plans to admit international students are in the making), major in software or hardware engineering, and are usually between the ages of 18 and 22. The student population is roughly 80% male, and 60% come from outside Fukushima Prefecture.

Concerning entry-level English, most students have had six years of instruction in junior and senior high school in English grammar, translation, and test-taking skills with little exposure to native speakers or opportunities to hear and use English prior to their arrival on campus, though some have supplemented this education with instruction at private English language schools or through short homestay trips abroad. Consequently, knowledge of grammar often ranks very high when applied to test-taking situations; however, students have great difficulty with listening, speaking, and writing English their first few months at the university. Entry level scores of the 1994 freshman class on TOEFL-like pretests ranged from 248 to 542 with the average score at 391.[4] This year, a program was implemented to retest students every six months throughout their four years of study to assist the university monitor student progress. Individual courses are also implementing their own pre and post-tests to supplement this data. Though it is still too early for results, student motivation to learn English quickly for immediate use on campus tends to be fairly high, and weekly rates of attendance in English courses surpass those at most other Japanese universities.

[3] NJ designates Native speakers of Japanese, and NNJ/E designates Non-Native speakers of Japanese and English

[4] Most universities in the United States require TOEFL scores of 450-500 for entry into U.S. undergraduate programs and scores of 550-600 for entry into graduate schools.

Curriculum

The following courses are offered by the Center for Language Research.

Courses Offered to Undergraduate University Students (NJ)[5]

Freshman Year Courses: 1st Semester

Conversation/Listening I
Composition I
Pronunciation
TOEFL Preparation (optional training seminar)

Freshman Year Courses: 2nd Semester

Conversation/Listening II
Composition II
Reading I
TOEFL Preparation (optional training seminar)

Sophomore Year Courses: 1st Semester

Technical Writing I
Reading II
TOEFL Preparation (optional training seminar)

Sophomore Year Courses: 2nd Semester

Conversation/Listening III
Technical Writing II
TOEFL Preparation (optional training seminar)

Junior Year Courses: 1st Semester

Public Speaking (elective)
TOEFL Preparation (optional training seminar)

Junior Year Courses: 2nd Semester

Research Methods (elective)
Intercultural Communication (elective)
Standardized Test-taking (elective)
TOEFL Preparation (optional training seminar)

Senior Year Courses: 1st Semester

Advanced Writing (elective)
TOEFL Preparation (optional training seminar)

[5] Each course meets once a week for 90 minutes for a total of 15 weeks each semester. Though this seems inadequate, students carry heavy academic coursework loads that typically keep them in class or in the research labs from 9 a.m. to 4:20 or 6:00 p.m., Monday thru Friday. Since many of their computer courses are taught in English, however, their exposure to English exceeds the number of hours spent in English language instruction.

NOTE: Since every part of the campus is connected to the university network giving students access to Internet and other services, students may register for their courses, receive assignments and course material, follow electronic tutorials, join class or campus-wide discussions, record their attendance, submit questions and obtain answers, search the campus libraries or the WWW for information, register evaluations of courses and instructors, place book orders for the library, etc. from any of the campus computer workstations. Students may access these 24 hours a day, seven days a week.

Courses Offered to University Faculty and Staff[6]

Pronunciation (NJ faculty and NJ staff)
Pronunciation (NNJ/E faculty)
Conversation (NJ faculty)
Conversation (NJ Staff)
Conversation (NNJ/E faculty)
Writing (NJ faculty)
Writing (NJ staff)
Writing (NNJ/E faculty)

Courses Offered to Jr/Sr High School English Teachers (NJ)[7]

Pronunciation (Jr H)
Pronunciation (Sr H)
Listening (Jr H)
Listening (Sr H)
Conversation (Jr H)
Conversation (Sr H)
Reading/Writing (Jr H)
Reading/Writing (Sr H)
Speech (Jr H)
Speech (Sr H)

NOTE: Though the names of courses are fairly generic, many of the classes employ technology that has been developed especially for the University of Aizu in joint projects between the faculty and major electronics and computer companies. Educational technology that proves successful here will be marketed internationally. Of particular interest to the many educators, corporate personnel, and government officials who tour the campus are the two Language Media Laboratories designed by Dr. Hisako Murakawa and Sony Corporation which offer state-of-the-art multimedia English pronunciation instruction available nowhere else. The system incorporates self-paced laser disc instruction (designed by Dr. Murakawa and Kawai Instruments), videos, recording features, computer vocabulary sound banks, sophisticated speech analyzers, and other features at 64 multimedia stations that can function independently or interact with each other for an assortment of instructional activities orchestrated by an instructor at the master control panel. Experiments are being planned for the incorporation of virtual reality to

[6]Each course meets once a week for 90 minutes for a total of 15 weeks each semester.
[7]Each course meets 90 minutes daily for a total of 5 days during the month of July.

further supplement language instruction after construction is complete this spring of a multimedia research center.[8]

Research Activities

Specific research activities at the CLR are presently delegated to five courseware teams (Conversation/Listening, Composition, Pronunciation, Reading, and Technical Writing) that are responsible for language research and instruction in these areas. Other research teams have been formed with researchers in computer science and/or private industry for the development of various software and multimedia products. Much of the research work is still in the early stages; however, as results become available, they will be disseminated through *University of Aizu Technical Reports* and the *Annual Review of the Center for Language Research* which appear in both hardcopy and on Internet at the University of Aizu's World Wide Web home page (*http://www.u-aizu.ac.jp/*). Research results applicable to particular conferences or journals will be disseminated through those avenues as well.

Composition Research

Some of the research projects being carried out by the composition research and instruction team (which the author of this paper presently directs) involve surveys and case studies to investigate professional writing practices in computer science, a study of student dictionary use and misuse, electronic calculations on the English in university documents and e-mail to prioritize vocabulary instruction, the construction of a database of language errors common among the Japanese student body, and the development of instructional material for use on World Wide Web within the University of Aizu.

The Panelist: Thomas Orr is Associate Professor at the University of Aizu's Center for Language Research where he directs the university's English composition research and instruction program. His current research centers primarily on the writing/research processes and products within the professional computer science discourse community. Other research projects underway concern EST curriculum design, World Wide Web courseware applications, and discourse community orientation.

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[8]Specific inquiries about pronunciation instruction may be addressed electronically to Professor Hisako Murakawa (*murakawa@u-aizu.ac.jp*) or Assistant Professor Steve Lambacher (*steve@u-aizu.ac.jp*).

Graduate Studies Program
Center for Biological Research
La Paz, B.C.S. Mexico

Roy Bowers

March 29, 1995

Overview

The Center for Biological Research in La Paz, Mexico, supports 125 researchers and graduate students in aquaculture, ecology, marine biology, biotechnology, and marine pathology. For financial, logistical, and political reasons, there is no official program for learning English at the CIB. Nevertheless, researchers are under extreme pressure to publish in international scientific journals; they must publish their work in English.

Educational Philosophy

The CIB program to improve the quality of scientific writing was based on the following assumptions.

- EFL scientists can help their writing by reading vast quantities of professionally relevant, comprehensible input.
- Error correction can be effective if students are taught how to profit from it.

Educational Environment and Facilities

The CIB has a complete library with access to all scientific journals via DIALOG. Every researcher has access to a computer with full Internet connection. Internet software includes Netnews reader (TIN), mail software (PINE), and Netscape for World-Wide Web browsing. In the absence of native speakers of English, these media constitute the only sources of English input at the Center.

Language-Learners

The English ability of researchers at the Center for Biological Research varies widely. Almost all of them were required to read English scientific texts during their undergraduate studies. The more fortunate had completed graduate studies in English-speaking countries.

Most researchers view English as essential for their publishing aspirations. Motivation is extremely high since their salary increases substantially with international publication.

Since CIB biologists were constantly reading scientific articles, some improvement in their writing might have been expected. To establish a relationship between their reading and their writing, I asked them to self evaluate (on a scale of 1-5) their comprehension of each section of a scientific paper (Abstract, Introduction, Materials and Methods, and Discussion). These sections are rank-ordered from easiest to most difficult.

1. Materials and Methods
2. Abstract
3. Introduction
4. Discussion (or Results and discussion)

Not surprisingly, their ability to comprehend these sections corresponded with their ability to write them. The Materials and Methods section was clearly the easiest section, for both reading and writing. The discussion section was the least understood, suggesting it was probably written in a style that was far above their linguistic competence. What was needed was scientific discussion that was more comprehensible.

Curriculum

The CIB has implemented a two-prong approach to improving scientific writing:

1. *To foster autonomous learning through comprehensible input, we have campaigned intensively to connect researchers with the vast quantities of scientific dialogue to be found on Internet biological forums.*

For non-native speakers of English, it is important to distinguish between scientific communication (that found in scientific journals) and scientific dialogue (such as that found in forums on the Internet). If scientific reading indeed helps to improve scientific writing, that input should be comprehensible. For this target group, much of what they were reading in journals appeared to be having little impact on their writing, perhaps because it was far above their ability to comprehend.

Our solution was to provide instruction on how to access the scientific forums on the Internet where the discussion appeared to be written in a more comprehensible style. This was later confirmed by questionnaire which indicated that researchers clearly understood the scientific dialogue on network forums in biology.

2. *To capitalize on the error correction that occurs during the editing/revision process writers were taught a retention strategy that would help them improve in subsequent papers.*

Revision and editing are an integral part of the EST setting where the final product must face the scrutiny of publishers. Since I was already editing their papers, it seemed logical to capitalize on this effort by providing some way for writers to learn from their errors. My goal was to see the fruits of correction reflected in subsequent papers and to minimize their dependence on my editing. Our solution was to show writers how to create a "digital learning log" using their word processor.

The "digital learning log" is a record of the writer's most common errors. A computer makes the creation of the learning log a matter of one keystroke. By invoking the learning log macro, text is automatically copied to a second document where it can be accessed for future reference.

The learning log process, by itself, had little effect on the number of writing errors. However, when writers reviewed the log right BEFORE they began to write a new paper, the number of errors in their papers dropped significantly. Thus, by reviewing their most common errors prior to writing, they were reminded of their personal linguistic pitfalls and stimulated to take corrective measures while they were putting thought to paper. The assumption here is that anticipation of an error is an important part of correcting it before it appears in print.

CIB researchers found the learning log to be an enjoyable, self-paced activity. Several researchers commented that before using the learning log, they never felt they were actually learning from correction.

Instructions for creating and using the learning log macro are available by sending the command GET LEARN LOG EST-L to LISTSERV@ASUVM.INRE.ASU.EDU (host of EST-L, Teachers of English for Science and Technology).

Discussion

Despite the lack of a conventional program in English language instruction, the dual approach described here seems to be effective. From all indications, writing is slowly improving.

Connecting this target group with Internet forums had an unexpected, yet positive, consequence. By carefully observing the writing style of forum participants, our researchers realized that clear and concise writing was indeed, powerful and authoritative. There is a cultural factor that figures prominently in this. In the Mexican culture, "coming straight to the point" in formal writing is not usually considered scholarly, or even interesting. Scientific writers began to see how economy of expression could be persuasive.

Networking with Internet academia convinced CIB researchers of the virtues of brevity. In turn, they attempted to write more concisely, and in so doing, managed to reduce the number of errors in their writing. As their writing became more concise, it also became more lucid. Leaders in the field of scientific writing agree that many writing errors which impede clarity stem from verbosity (Day, 1979, 1992; Woodford, 1986; Booth, 1993).

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Acknowledgements

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To subscribe to EST-L, send the e-mail message: SUBSCRIBE EST-L [your first name] [your last name] to: LISTSERV@ASUVM.INRE.ASU.EDU

The Panelist: Dr. Roy Bowers is Scientific Writing Editor and Academic Coordinator of the Graduate Studies Program at the Center for Biological Research, La Paz, Mexico.

- Current thrill: The World Wide Web for language learning
- Spare time: Managing EST-L and exploring Baja California

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Deborah Busch and Alfred de Prospero

March 29, 1995

Overview

For five consecutive summers, Delaware County Community College (DCCC) in Pennsylvania, a member of the U.S. based Community Colleges for International Development (CCID), has sponsored an intensive four-week program for the electrical engineering faculty at Czech Technical University (CVUT) in Prague. The program was originally conceived as an informal, loosely organized conversation course; however, by the second year, CVUT faculty were indicating a need for more specialized training in English for academic and professional purposes, particularly in science and technology. Each year, EAP/EST components of the program have been added.

History

The nature of this program cannot be separated from the historical context of The Czech Republic over the past few years. After the 1989 Velvet Revolution in which the former Czechoslovakia peacefully overthrew the Communist regime, the country suddenly found itself confronted with the challenges of remaking itself into a democratic, free market economy. To gain access to worldwide scientific and professional communities, English suddenly became a priority: Russian was dropped in favor of English as the primary foreign language, and university faculty, who had been doing their research in Russian, have had to switch to English.

Give this historical context, Czech universities have been swept up by the rapid changes in the country. Limited resources are a serious problem. CVUT, like other universities, is in financial distress, searching for its place in the new democracy and experimenting with radical changes in structure. One such change is that this year students for the first time will have to pay tuition. Since Czech universities do not have the resources to upgrade their English language resources, there has been a mini-

boom of funding from international and philanthropic organizations to provide language training programs: the DCCC/CVUT exchange is one such program.

Educational Philosophy

The driving force in this program is ongoing needs assessment to tailor the curriculum to the aspirations of the participants. The five-prong approach to needs assessment in specially designed programs (adapted from Busch and Overholt, 1991) includes a consideration of the following information:

1. The applications and situations in which participants will use English.
2. The participants' perceptions of their linguistic and professional needs.
3. The sponsoring organization(s)' perception of the needs, and specification of program parameters (e.g., cost, length of time).
4. The English proficiency level of participants entering the program.
5. The amount and kind of instruction required to bring participants to the desired level of proficiency.

The curriculum has been revised each year in response to information gathered in each area mentioned above. Questionnaires, interviews, program evaluations, faculty evaluations, and placement tests are used to fine tune the program. The curriculum is designed to cover as much as possible in the small amount of time (only four weeks) available each summer. Thus, the program is highly practical with a combination of small classes and individual assistance with professional projects. As a result of the needs assessment, the two main objectives for the program are:

1. To upgrade the general English skills (conversation, listening, and writing) of all participants.
2. To provide EAP and EST instruction in specific skills for those already involved in the international technical and professional arenas.

Educational Environment and Facilities

Facilities at the on-site location in the electrical engineering faculty at CVUT are less than ideal for language teaching. Poor classroom acoustics, lack of audiovisual equipment, and restricted access to photocopying represent some of the limitations in resources. Also, teaching materials and resources are scarce. Therefore, DCCC faculty, using their own money, have purchased and transported materials from the United States. A small resource library has finally been established on site for use in future years.

Language-Learners

The program, sponsored by the Faculty of Electrical Engineering, was originally open to only the part time and full time teaching faculty at CVUT (e.g., professors of engineering, physics, and computer science), but has expanded to include graduate students, research assistants, and some university administrators. The largest ever program size was 110 students, but this has been scaled back to approximately 50 due to resource limitations. About 45% of the participants have enrolled for more than one year. The English ability levels range from high beginning to advanced, and participant ages from 23 (graduate students) to 65 (senior professors). A placement test is used to group the participants into classes of 10 to 12 students.

Curriculum

The program schedule and curriculum in 1994 was set up as follows. In the morning all participants attended two one-and-a-half hour courses devoted to speaking and listening practice: the first class was in conversational strategies, the other, speaking and listening in academic/professional settings. In the afternoon, participants chose from among four seminars (held on Monday, Wednesdays, and Fridays): 1) General Writing, 2)Technical Writing, 3) Travel and Exchange Opportunities, and 4) Teaching Technical Content in English. On Tuesdays and Thursdays, participants could choose to attend a series of discussions (on aspects of American culture and ethics in science and technology), or classes in pronunciation, conversation, idioms, and TOEFL test practice. In addition, many opportunities were provided for informal social exchanges.

Faculty

An interesting aspect of this program is that it was originally supported by DCCC administration as a faculty development opportunity for DCCC professors to teach abroad. Additional faculty from other community and 4-year colleges have also participated in the program. For three years, DCCC provided part of the air fare while CVUT has provided housing and a stipend. Last year, unfortunately, due to budgetary problems, the DCCC administration was unable to provide air fare. However, due to the commitment of faculty, who must now pay their own expenses, the program is continuing.

While this program (and similar programs in Latvia, Lithuania, Estonia, and Slovakia) has provided DCCC faculty with international experience, the move towards EAP and EST has created a conflict between the need for trained teachers in these areas and DCCC's commitment to provide travel abroad opportunities for any faculty member, even if they lack experience in teaching English as second language. Staffing issues continue to be a problem.

Teacher-Training

The latest development at CVUT has been the establishment of degree programs in engineering to be taught entirely in English by Czech professors. It is hoped that this will attract international students (primarily from the Mideast and Africa) who can afford to pay higher tuition rates. A seminar, offered for the first time at CVUT through the DCCC program in the summer of 1994, was designed to train Czech professors to teach science and technology to other non-native speakers, i.e., the international students in the English track. The course addresses two concerns that the Czech professors have raised: their insecurity about teaching in English, and the problems of teaching international students at varying levels of English proficiency. The course presents possible solutions to these problems. Of particular interest is the training of the professors in the use of interactive teaching techniques, a methodology which helps to provide effective teaching of both language and content, and relieves the pressure on professors to present traditional lectures in perfect English. The situation here has similarities to that of International Teaching Assistants (ITA's) in the U.S., who teach content in English, and to the situation of content teachers who have students of low English proficiency in their classes. The course draws upon the research and methodology in both of these areas.

Personal Perspective

The program has assisted CVUT faculty and graduate students in writing dissertations, publishing papers, preparing conference presentations, and hosting international conferences and guests. It has also assisted a number of faculty members to attain visiting professor positions in U.S. universities, and to teach technical content in English. In retrospect, over the past five years, the program has contributed greatly to the rise in the general level of English proficiency in the Faculty of Electrical Engineering. In addition, the program has resulted in continuing friendships and cross-cultural exchanges. It is a credit to the participating U.S. faculty that they have been willing to donate their time and resources to keep the program in operation.

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The Panelists:

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EFL Unit
Department of General Studies
Technion-Israel Institute of Technology
Haifa, Israel

Shimona Kushner

March 29, 1995

Overview

The Technion-Israel Institute of Technology, located in Haifa, Israel, opened its doors 71 years ago. It is a four year institution with a world-wide reputation in both teaching and research. There are 7,500 undergraduate students and an additional 2000 graduate students in both the masters and Ph.D. programs. Its faculty numbers approximately 600 in 22 undergraduate and graduate departments.

At its establishment a very significant debate ensued among its founders concerning the proposed language of instruction. The language of technology at the time was German, many of the first teachers were German trained, and a major group among the founders was a German-Jewish philanthropic organization all pushing for German to be the language of instruction. But as this was also the time of the revival of Hebrew as a living language, there was a significant faction among the founders who deemed it ideologically imperative to conduct instruction in the newly reborn language. The proponents of Hebrew won out,[1] but this required the immediate creation of technical and scientific terminology in Hebrew, a task which continues to this day.[2]

History

All classes at the Technion are conducted entirely in Hebrew and much of the required reading material is either written in or translated into Hebrew. However, up-to-date professional material is to be found mainly in English, making reading proficiency in English imperative, for both immediate academic and long-term professional success.

[1]On the "Battle of the Languages" connected with the establishment of the Technion, see, for example, *Toldot ha-Tekhniyon be-reshito 1908-1925*. Haifa: Technion, 1953

[2]An official body, The Academy of the Hebrew Language, is responsible for coining all new words in Hebrew. A branch of the Academy, the Committee for Technical Terminology, is associated with the Department of General Studies at the Technion-Israel Institute of Technology. It is specifically responsible for coining terms in all technological fields. The newly coined words are derived from existing Hebrew roots.

English language instruction at the Technion is the responsibility of the EFL Unit of the Department of General Studies, a non-degree granting, service department. All instruction, both elective and compulsory, which is not technical or scientific is provided by the Department. These include courses such as languages, history, philosophy, art, drama, music, Jewish studies, physical education, and more.

The EFL program began in 1957. From the outset it was an ESP course conducted in English focusing on science and technology. Until that date it was assumed that students with a high school matriculation certificate would have sufficient English language skills to cope with any academic texts–a feeling that by the late 1950's was not borne out by reality. The initial curriculum encompassed a wide spectrum of skills–reading, speaking, writing, and listening.

Today there is very little need either as students or later as professionals for English oral or written skills, other than in fields with a high level of foreign contacts such as computers, electrical, mechanical, or aerospace engineering. As a result, the emphasis from the 1980's has been almost entirely on reading comprehension.

Educational Philosophy

The approach is EAP in science and technology (S&T). The program is flexible and eclectic. The classes are based on the concept of what Widdowson (1990) calls "authenticity"—the authenticity of materials, the learners' interpretations, the tasks, and the classroom situation (p. 46).

In addition to reading comprehension, the curriculum provides formal instruction in those grammatical structures which are either particular to S&T discourse (See Trimble, 1985) or conflict with Hebrew and can, thus, result in a lack of comprehension. Vocabulary acquisition is viewed as extremely important for valency, (Widdowson, 1990) but also because there is very little transfer of technical and scientific lexis from Hebrew to English as there might be in other languages.

Educational Environment and Facilities

Very high level of studies and students of a very high standard. The heavy schedule and the need to maintain a high grade point average places undergraduates under great pressure. Students are very goal-oriented and tend to view anything outside their major field as irrelevant and superfluous. Those who perceive themselves as having a "satisfactory" level of English proficiency put English into this category.

Undergraduate students often do not see any practical need for English studies as very little reading in the language is required of them in the first two years of study,[3] the very period during which they are required to take their compulsory English courses.

An additional affective factor is the 45-60 days a year many spend in reserve duty

[3]according to data gathered by the author in a 1994 survey of all Technion faculty on the amount of English reading assigned to their students in each year of their degree

in the army. Upon their return all material and exams missed must be made up, with the "heavier" subjects being viewed as worthy of the most attention. All these factors often contribute to a low level of motivation for EFL studies.

Positive motivational factors are: The need to use English in their computer work and the fact that in their junior and senior years most departments require or strongly recommend reading of English professional material. In departments such as computer science, electrical, mechanical, aerospace and management engineering, and medicine, academic success is heavily dependent on a high degree of outside reading in English.

The Department provides full secretarial services in both Hebrew and English and has its own departmental library, language laboratory, video projection room, theater for the presentation of student productions, and concert room. The Technion has its own duplicating service on campus as well as more extensive audio-visual facilities for recording, projection, and filming.

Language Learners

The vast majority of the student population is composed of native Israelis, either first language Hebrew speakers or first language Arabic speakers (Arabs and Druze) who have Hebrew as a second language. There is a smaller non-native Israeli population coming from a variety of backgrounds (European, North and South American, and, more recently, from the ex-Soviet Union).

Approximately 1900 undergraduate students study EFL at the Technion each year. They major in the following fields: Civil Engineering, Electrical Engineering, Mechanical Engineering, Aerospace Engineering, Agricultural Engineering, Chemistry, Chemical Engineering, Physics, Biology, Food Engineering, Biotechnology, Mathematics, Applied Mathematics, Computer Science, Management Engineering, Economics, Materials Engineering, Architecture and Town Planning, Landscape Architecture, Medicine.

None of the students are true beginners. All Israeli high school graduates come with eight years of EFL instruction in modern English and American literature, grammar, writing, oral, and aural skills. Students coming from abroad often have had less English instruction, particularly those coming from the ex-Soviet Union. Israeli students receive a great deal of English input from films, television, pop music, tourists, and travel abroad.

The overwhelming majority of our courses are at the undergraduate level. At this level there is no need for any writing or aural-oral use of English. However, in the job market some graduates will have a need for international negotiation, presentation of work/projects to foreigners, or application to international funds for grants all of which will require additional skills in English. The Department, as yet, cannot address these situations on a large scale.

Curriculum

The EFL Unit offers four types of programs: Compulsory undergraduate courses, remedial courses for M.Sc. students who have failed the Technion graduate proficiency exam, a Ph.D. course in academic writing, and elective undergraduate English courses.

The undergraduate program is divided into four levels. Beginners' English, 5 hours per week, in which about 5% of the weakest, and new immigrant students who are deficient in English, study.

Two intermediate levels: Lower Intermediate (English 11)[1] 5 hours per week, and Upper Intermediate (English 1) 3 hours per week. All three of these levels are general EST courses, with the exception of the English 1 courses for architecture and medicine, which are specific to their field. Advanced level (Technical English) 4 hours per week is an ESP course by major. All are 14 week courses. EFL studies must be completed within the first three semesters of study.

The materials used in the EFL Unit are all self-produced. The reasons for this are two: 1) The fact that no commercially available material suited the framework of our courses; 2) One of the criteria for advancement for faculty members in the Department is producing teaching materials. The material is all authentic, edited at the Beginners and English 11 levels, only slightly edited at the English 1 and Technical English levels. The materials are chosen in consultation with subject matter teachers in order to ensure relevancy.

Undergraduate elective courses in English presently offered are: Literature and Discussion, Conversational Skills, Technical Report Writing, and an integrated Conversation and Listening course. Each is a one-semester course with limited enrollment. The course in academic writing is for Ph.D. students, who must publish their research in international academic journals. The course combines frontal instruction with individual tutorials.

A project presently underway in the unit is the development of CALL material in order to offer all students an additional approach to language learning and to facilitate make up and review for students missing classes due to reserve duty.

Technical English-Architecture

With this course we had a unique opportunity to create something different within the framework of the courses offered in our department. We wanted to integrate the Technical English curriculum with the specific aptitudes possessed by the architecture students and the idiosyncrasies of their field within the Technion context. This is an advanced level course. The students in this department usually possess a high level of language skills. Authentic material is presented on the history of architecture, architectural philosophy, the writings of architects, and technical texts in areas such as materials and structure, reflecting the type of reading they will encounter in the future.

[1]The numerical labels are those used to designate all courses at the Technion.

In addition to the regular Technical English syllabus we integrate writing tasks, show video films in English on architectural topics, and integrate the visual with reading by having them draw what they have read in the text. Short talks on architectural topics are assigned, often tying in reading assignments.

Faculty

EFL teachers must hold either M.A. or Ph.D degrees in English language or literature, or EFL. If native speakers, degrees in science or technology, with experience in language teaching, are also acceptable. We have about 20 teachers in the Unit of whom half are either tenured or full-time/tenure track. Tenure is granted on the basis of publication and teaching. The majority of the teachers are native English speakers; the others are either native speakers of Hebrew or native speakers of Russian, with native English speaker proficiency. We do not generally need to recruit teachers, as there are usually enough applicants to fill our teaching needs.

Teacher Training

New teachers are always hired with proven experience so that under normal conditions there is no need for teacher training. Standards are maintained and research finds and teaching methods disseminated through departmental seminars and through U.T.E.L.I. University Teachers of English Language in Israel, an inter-university professional organization which holds regular conferences and seminars.

A special problem was posed by the teachers hired from among the recent immigrants from the ex-Soviet Union. The emphasis there was different and, in some cases, they were not familiar with applied linguistics theory and practice. They had many years of experience teaching at university level, thus demanding their retraining proved to be a sensitive issue. They were informally attached to more veteran teachers to help with ongoing questions and problems. Obviously, the rate of success is dependent on the willingness of the teacher to cooperate and accept guidance. A video series on current teaching methods produced by Israel's Open University may prove to be a less threatening way of overcoming the problem.

Research Activities

Areas of research activities in the EFL Unit are computer-aided language learning, discourse analysis in S&T, error analysis and materials development.

Personal Perspective

I would like to see a revision in the program so that the progression is linear - Beginners, English II, English I, and Technical English. This would give the weaker students more exposure to English, thereby improving their skills and possibly enabling the inclusion of other skills in the curriculum. I would also like to see a more advanced

undergraduate course which would cater to the 25% of our students who are exempted entirely from EFL studies and who receive no university level instruction in English at all. In order to increase awareness of the relevance of EFL studies, subject matter faculty should be strongly encouraged to require more English reading, and at an earlier point in the program, and to test this material on their exams.

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The English Centre
The University of Hong Kong
Hong Kong

Elizabeth Ann Mueller

March 29, 1995

Overview

The University of Hong Kong (HKU) was first incorporated in 1911 to take over the work of the College of Medicine established in 1887. The Faculty of Engineering, founded in 1912, is now one of nine faculties. It provides two three-year curricula. One leads to a degree of Bachelor of Engineering in Civil and Structural Engineering, Computer Engineering, Electrical and Electronic Engineering, Electrical Energy Systems Engineering, Industrial and Manufacturing Systems Engineering and Mechanical Engineering (including Environmental and Industrial Automation). The other curriculum leads to a degree of Bachelor of Science in Computer Science (including an Information Systems stream). The professional bodies which recognise the faculty's degrees are the Institute of Civil and Structural Engineers, the Hong Kong Institute of Engineers, the Institute of Electrical Engineers, the Institute of Mechanical Engineers, and the Institute of Marine Engineers. The faculty is serving 623 first-year engineering students in the 1994-95 academic year. There is also a robust postgraduate program.

Originally, the university was staffed by expatriates. In recent decades, local graduates have received advanced degrees and have taken up teaching at HKU. The engineering faculty has 117 full-time teaching staff, the majority or whom are NNS of English with Cantonese as the L1.

History

The history of courses for English enhancement at HKU must be considered in the colonial context of the territory. As in other British territories, the language of government, law, high commerce and the education to achieve "success" in colonial terms has been English. This still strongly influences the current debate on the medium of instruction and produces ambivalent attitudes towards the use of English.

HKU was once a fully English medium university with primarily expatriate teaching staff. The student body came from local parochial schools which maintained a high stan-

dard of English. In the 1980s, universal education was introduced in Hong Kong. The large population required Chinese medium schools as well as English medium and mixed code schools, with the demographics generating far more Chinese medium schools. Over the years, scholars of high calibre have graduated from these schools but the proficiency level of English has changed. At the same time, the profile of HKU's faculties, in particular the Faculty of Engineering, has also changed as increasingly large numbers of local graduates have joined the faculty. The combination of events has led to conditions within the faculty in which students claim that their English proficiency declines over the 3 years they attend the university. Lectures are conducted in English, textbooks are in English, assignments, reports and exams are in English. Yet, there is little or no two-way communication in English. Engineering graduates of HKU who were once highly sought after are now less competitive. Increasing numbers of graduates and decreasing English communication skills are both cited as reasons.

Prior to 1985, only voluntary English enhancement courses were offered to engineering students. In 1985, the engineering faculty negotiated with the Language Centre (of which the English Centre was then a section) to resource a 20-hour writing course for 168 students out of some 500. As a consequence, many students' writing support needs were not provided for. The 168 were selected by a writing test and were required to pass the course based on attendance, effort and actual performance (judged generously).

In response to increasing complaints about graduates' falling standards of English, a University-wide English enhancement program was initiated in 1991. The engineering faculty agreed to a 48-hour course for all first-year undergraduate engineering students as a 1/2-paper (or credit). The Department of Computer Science negotiated separately for a full 1-paper course. The willingness of the faculty to give the credit-bearing status, (after some lobbying) gives the courses much needed credibility in the eyes of students and staff. The course is called Professional and Technical Communication, or Protech.

Educational Philosophy

Four principles govern the Protech course.

One is to enhance the existing language skills of first-year students. A significant increase in proficiency levels in 48 hours is not an expectation. Projects with relevance to professional and technical contexts require students to apply their English language skills to the communicative tasks embedded in the projects. Language teaching per se — grammar, vocabulary development, pronunciation — is less overt and is dealt with only as needed in relation to the development of a piece of writing or oral presentation. This has been referred to as *teaching by stealth*, yet it is an effective approach as the purpose and application of "the rules" are readily evident to students.

The second principle is in relation to the rest of the students' coursework. Whereas lecturers would prefer clear, concise and correctly written work, there is nevertheless a high tolerance for inaccuracy as long as key words are evident. Faculty members

feel moreover, that so much work is mathematical, that skilled writing is of secondary importance. In contrast, the Protech course maintains that accuracy is significant. It is a criteria for real-work assessment of work and so holds equal importance with content.

The third principle guiding the course is the need to serve as a bridge from 'school' English to the language expectations of the professional world. Students have had virtually no experience communicating outside the home or school context. As much as time permits, students are required to seek information outside the classroom and off-campus. In doing this, they may or may not communicate in English, but the outcomes of their work must be presented in English simulating the real-world context of Hong Kong.

A fourth principle concerns relevance. Unlike arts and science students (at HKU), those in engineering are already focused on future careers. Course design and content must be perceived by students as contributing toward those professional goals.

Educational Environment and Facilities

Except for the Department of Chinese, the primary teaching medium at HKU is English. Support teaching such as tutorials in the engineering faculty is for the most part in Cantonese. Some departments in the engineering faculty have only teaching staff who are NNS of English and whose L1 is Cantonese. Other departments have a minority of NS and NNS of English from diverse linguistic backgrounds - American, Australian, British, German, Indian, Persian and Sri Lankan.

The English Centre has access to 2 well-equipped language labs but engineering students have little time for self-access language development. Some departments have their own computer facilities and the university has two computer centres for all students. It is reasonable to require all final written work to be word processed. There are technical services available including video cameras, video monitors, audio cassettes and dubbing facilities.

First-year students have an average of 35 class hours per week, including lectures, labs and tutorials. On top of that, they can expect another 35 hours homework, minimum. Some departments require students to take practical training courses in the summer months. Students face a very concentrated 3 years of study.

Language Learners

The issue of the medium of instruction in Hong Kong's secondary schools is currently under debate. Parents' believe that instruction in English ensures career prospects. Researchers contend that students studying in the mother tongue produce better scholastic results. School claim that they are English medium school but more frequently rely on mixed code and Chinese. HKU's students come from this learning environment. They will have passed seven advanced level subjects, six of which are obtained at the same

time, one of which must be English, one Chinese language or another language and English and one must be mathematics. High math and physics grades are essential for acceptance to the engineering faculty.

The university policy is to accept only students who have a grade D or better on the Hong Kong Use of English Certificate, an exam all advanced-level students take. Research indicates that this is comparable to a mean TOEFL score of 543, but anecdotal evidence is that grade D is borderline for functioning under university expectations; however, it is the consensus of the Protech teachers that engineering students are on the whole, earnest, responsible and goal-oriented. By and large, they make a genuine effort to rise to expectations.

Civil Engineering students (113 in the first year) generally go directly into the local Civil Service as graduate trainees as well as into the booming infrastructure development in Hong Kong. These graduates will be relegated to junior positions until they sit for higher professional qualifications. Those who seek advancement, generally go abroad for further study and are required to demonstrate reasonable proficiency on the TOEFL or IELTS.

Computer Science students (87 in the first year) are required to take the Protech course to prepare them for information systems professions. It is understood that most of these students will pursue such a career. These students are very bright and inclined to be more confident with the use of English than their peers in other departments.

Electrical and Electronic and Computer Engineering students (198 in the first year) are traditionally the best in the faculty. The local electronics import-export industry and the burgeoning telecommunications industry in Asia offer good career opportunities. Many students enter these departments with high marks in all their school subjects as well as School Certificate English, but there is also a significant proportion who have not excelled in English.

Industrial and Manufacturing Systems and Mechanical Engineering students (225 in the first year) generally have good math and physics backgrounds but are poor in language skills. These students will seek careers in production management and other business sectors. Building services, technical sales, and utility companies hire a good number of these graduates. They will face competition for management level jobs with students from the polytechnics who will have had work-study opportunities prior to graduating.

Curriculum

In preparation for the course, a needs analysis was conducted in 1991-92. The results revealed that students managed their engineering coursework with the English proficiency they had, though it was felt that the language demands were not rigorous. The concern for improvement in English was for professional life (primarily commerce and industry) after graduation. Unfortunately, resources and time constraints have

only allowed for a first-year course aimed at strengthening language skills. (The University Senate has just recently agreed to an English Centre initiative to offer English enhancement courses beyond the first year level.)

Course development and teaching materials are undertaken by core course teams. Objectives, handouts and teachers' notes are prepared, piloted and revised over several years. In Protech, projects and topics are changed annually to avoid student copying of written tasks (a problem within the Faculty) and to keep materials as current as possible. Moderation of assessed tasks throughout the course, means that teachers need to follow the syllabus fairly consistently.

The Protech course is currently comprised of 4 streams. Protech for Civil Engineering was originally a 5-week course in oral presentations, requested by the department. This component was part of a departmental course for all first-year students called Engineering and Communication Studies. The English Enhancement Program has extended this to a 48-hour course to include learning about books, journals and the use of the Library, gathering information off-campus from local civil engineering offices - the Planning Department, the Noise Control Authority, the Building Ordinance Office and the Geotechnical Engineering Office and then dealing with letters of complaint relevant to those offices, writing proposal, gathering comprehensive information on a large engineering project (the Three Gorges Dam in the PRC) and oral presentations. The syllabus was designed in consultation with civil engineers practising in Hong Kong.

The stream for Computer Science and Information Systems involves students in the communicative tasks required of a systems analyst. Students practice interview techniques, write reports, make oral presentations and conduct system investigations off-campus in professional establishments, e.g. schools, clinics and small businesses. The course was designed to meet the needs specified by the CS department. There is a very high degree of relevance to the rest of their syllabus and the course is rated highly by both staff and students.

Protech for Electrical and Electronic and Computer Engineering, has been problematic because students' coursework is of a more esoteric nature for language teachers and the departments have been reluctant to contribute ideas. At the same time, students in these departments are particularly sensitive to the relevance of topics covered in the course. After three years of development and revision, the course now includes oral presentations on topics related to their disciplines, a team project to construct an electronic burglar alarm with limited materials (with creativity as an assessment criteria), business communication skills - letters, memos, minutes, and a simulated telecommunications consultancy project. In the December 1994 course evaluation, 94% of the CE students and 91% of the EEE students found the course to be useful. 67% of the CE students and 69% of the EEE students found the course to be relevant to them as engineers.

The course for Industrial and Manufacturing Systems and Mechanical Engineering allows for as much primary data gathering as possible. Working in small groups, stu-

dents complete projects in which they construct and test structures or devices, note results, draw conclusions and make recommendations. Groups follow agendas for their meetings and write minutes. Project outcomes are oral presentations and written reports. Students are expected to present their findings in terms which can be understood by non experts, a difficult prospect they face upon entering the professional world. Several Faculty members of these departments have been helpful in making suggestions regarding the contents of the course.

Faculty

The English Centre has a teaching staff of 38. Among those, 17 are teaching on the Protech course. Four are NNS of English with Cantonese as their L1. The rest are NS of English from Britain, Canada and the United States.

Teacher Training

The English Centre will offer a Master of Arts Degree in Applied Linguistics starting in September 1996. The newly established Centre for the Advancement of University Teaching is working with the English Centre to run programs and workshops for staff on teaching methods, teaching in a bilingual setting, orientation to new academic staff and teacher training for research students, many of whom are NNS of English.

Research Activities

The English Centre is currently conducting a needs analysis in preparation for a writing support program for graduate students in all faculties. This involves analysing a questionnaire sent to all post-graduate students, interviewing advisors and analysing students writing samples, leading to the development of a diagnostic framework for assessing students' writing ability. The framework will initially be for use by teachers and advisors, but it is intended that eventually, students will be trained to use it as a self-help tool.

The University Grants Committee of Hong Kong has given funds to a project "to develop materials and support services for action learning projects to enhance the quality of teaching". Part of this grant was awarded to a project which aims to find ways to increase the use of English in small group work, in the English Centre classes for science and engineering students. The first part of the action learning cycle has been completed and action plans will be implemented in September 1995.

One study currently being undertaken is directly concerned with ESP. It seeks to analyze the cultural organization and realization of the physics curriculum in the science faculty and and the mechanical engineering curriculum in the engineering faculty to determine what constitutes the culture of each. The information collected will then go on to inform the develpment of ESP courses as they prepare students to join the culture

of their chosen disciplines.

There are plans to mount a study to look at the language needs of university graduates in the workplace in Hong Kong. Several similar studies have been undertaken, but this one would be specifically to inform the direction of the English Centre's work and the language environment of the University.

Another upcoming research study will be to follow the language development of students in selected faculties via an entry and exit test of proficiency. There is now only anecdotal evidence that students' English proficiency declines during their tenure at the university.

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